



## Comparing the partitioning behavior of *Giardia* and *Cryptosporidium* with that of indicator organisms in stormwater runoff

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**Year:** 2008  
**Journal:** Water Research. 42 (17): 4421-4438

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### Abstract:

Microbial association with particles can significantly affect the fate and transport characteristics of microbes in aquatic systems as particle-associated organisms will be less mobile in the environment than their free phase (i.e. unattached) counterparts. As such, similarities or dissimilarities in the partitioning behavior of indicator organisms and pathogens may have an impact on the suitability of a particular indicator to act as a surrogate for a pathogen. This research analyzed the partitioning behavior of two pathogens (*Cryptosporidium*, *Giardia*) and several common indicator organisms (fecal coliform, *Escherichia coli*, Enterococci, *Clostridium perfringens* spores, and coliphage) in natural waters under both dry and wet weather conditions. Samples were taken from several streams in two distinct sampling phases: (i) single grab samples; and (ii) intrastorm samples obtained throughout the duration of four storms. Partitioning behavior varied by microbial type, with 15-30% of bacterial indicators (fecal coliform, *E. coli*, and Enterococci) associated with settleable particles compared to 50% for *C. perfringens* spores. Both pathogens exhibited similar levels of particle association during dry weather (roughly 30%), with increased levels observed during wet weather events (*Giardia* to 60% and *Cryptosporidium* to 40%). The settling velocities of particle-associated microbes were also estimated, with those of the bacterial indicators (fecal coliform, *E. coli*, and Enterococci), as well as *C. perfringens* spores, being similar to that of the *Giardia* and *Cryptosporidium*, suggesting these organisms may exhibit similar transport behavior. With respect to intrastorm analysis, the highest microbial concentrations, in both particle-associated and free phase, occurred during the earlier stages of a storm. The total loadings of both indicators and pathogens were also estimated over the course of individual storms.

**Source:** <http://dx.doi.org/10.1016/j.watres.2008.06.020>

### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event

**Extreme Weather Event:** Flooding

#### Geographic Feature:

resource focuses on specific type of geography

# Climate Change and Human Health Literature Portal

Freshwater

## **Geographic Location:**

resource focuses on specific location

United States

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Foodborne/Waterborne Disease

**Foodborne/Waterborne Disease:** Cryptosporidiosis, Giardiasis

**Foodborne/Waterborne Disease (other):** fecal coliform; Escherichia coli; Enterococci; Clostridium perfringens

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Time Scale Unspecified